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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/080,861

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Greg Steele

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Keith D. Nelson
Lockheed Martin Corporation
Building 220, Mail Stop A08
P.O. Box 49041
San Jose, CA 95161-9041

EXAMINER

WARE, CICELY Q

ART UNIT

PAPER NUMBER

2634

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/080,861

Applicant(s)

STEELE ET AL.

Examiner

Cicely Ware

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-8 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because:
 - a. Pg. 9, line 10, applicant uses the phrase "may be lock on to". Examiner suggests using "may be locked on to" for clarification purposes.

Correction is required. See MPEP § 608.01(b).

2. The disclosure is objected to because of the following informalities:
 - a. Pg. 2, line 12-13, applicant uses the phrase "provides for a blind narrow-band interference cancellers". Examiner suggests using "provides for blind narrow-band interference cancellers" for clarification purposes.
 - b. Pg. 4, line 17, applicant uses "thee". Examiner suggests using "the" for clarification purposes.

Appropriate correction is required.

3. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 4, 7, 8 rejected under 35 U.S.C. 103(a) as being unpatentable over by Rakib et al. US Patent 6,426,983).

(1) With regard to claim 1, Rakib et al. discloses (Fig. 1) a receive antenna (12) for receiving communications signals of interest and unknown narrow-band interfering signals (col. 4, lines 6-16, col. 5, lines 47-51); a downconverter (10) coupled to the receive antenna (col. 4, lines 21-36); a signal clock recovery circuit (Fig. 5 (50, 52, 54)) coupled to an output of downconverter; a blind narrow-band interference canceller coupled to an output of the sampling circuit for filtering the communications signals of interest and unknown narrow-band interfering signals to produce an output that is statistically white containing most of the signal of interest, and a small portion of the interference, and for locking on to the desired signal of interest (Fig. 14, Fig. 15) (col. 13, lines 24-67 – col. 14, lines 1-67); and a symbol decoding circuit (Fig. 13 (204), Fig. 14 (204)) coupled to an output of the interference canceller for outputting the communications signals of interest without interference (col. 14, lines 1-67).

However Rakib et al. does not disclose a sampling circuit coupled to an output of the downconverter and to an output of the signal clock recovery circuit for providing an oversampled signal containing the communications signals of interest and unknown narrow-band interfering signals.

However it is well known in the art that oversampling the input signal in each subband is used to create subband signal redundancy. The advantages of oversampling are threefold. Firstly, oversampling induces signal redundancy in each

subband. This residual redundancy can be exploited in order to improve the ability of a receiver to detect and correct transmission errors. Secondly, there exist many possible PR synthesis banks for a given analysis bank, as compared to critically sampled filter banks where there exists only a single PR synthesis bank for a given analysis bank. This allows for an increase in the design freedom where a PR synthesis bank can be chosen appropriate for the application at hand. Thirdly, improved noise immunity is obtained for each subband filter. This results in the freedom to design subband filters with better attenuation than the critically sampled case, allowing for a coarser approximation in the quantization of the subband signals. However, like most engineering design issues these advantages do not come without drawbacks. As the subband signals are sampled at a rate higher than that required by Nyquist for perfect representation, the signal redundancy in oversampling makes for more computations required to process a signal, most of which are unnecessary to perfectly represent the input signal. Therefore efficient implementations are of interest in an effort to reduce the computational complexity of an oversampled filter bank. Basically oversampling improves the ability of a receiver to detect transmission errors and creates a signal with improved noise immunity. Therefore claim 1 does not constitute patentability.

(2) With regard to claim 4, see rejection of claim 1. Rakib et al. discloses receiving input signals comprising communications signals of interest and unknown narrow-band interfering signals (col. 4, lines 6-16, col. 5, lines 47-51); oversampling the signals of interest and interfering signals to produce signals contain a statistically white component comprising the signals of interest and a correlated component comprising

the interfering signals (col. 9, lines 19-29); adaptively filtering (Fig. 15, (234)) the oversampled signals equalizing the adaptively filtered signals to lock on to the desired signal of interest (col. 13, lines 24-67 – col. 14, lines 1-67).

(3) With regard to claim 7, claim 7 inherits all the limitations of claim 4. Rakib et al. further discloses the adaptive filtering step comprises adaptively filtering the oversampled signals using an adaptively formed prediction-error filter that is computed using correlation statistics of the oversampled signal to produce an output that is statistically white containing most of the signal of interest, and a small portion of the interference (col. 14, lines 1-67).

(4) With regard to claim 8, claim 8 inherits all the limitations of claim 4. Rakib et al. further discloses in (Figs 13 14, 15) equalizing the adaptively filtered signals an adaptive decision-feedback equalizer to lock on to the desired signal of interest (col. 13, lines 24-67).

6. Claims 3 and 5 rejected under 35 U.S.C. 103(a) as being unpatentable over Rakib et al. US Patent 6,426,983) as applied to claims 1 and 4, in view of Petrus et al. (US Patent Application 2001/0031022).

(1) With regard to claim 3, claim 3 inherits all the limitations of claim 1. However Rakib et al. does not disclose a second receive antenna for receiving the communications signals of interest and the unknown narrow-band interfering signals; a second downconverter coupled to the second receive antenna; and a multiplexer having

inputs coupled to the downconverters and having an output coupled to the blind narrow-band interference canceller.

However Petrus et al. further discloses in (Fig. 2) a second receive antenna (203) for receiving the communications signals of interest and the unknown narrow-band interfering signals; a second downconverter (205) coupled to the second receive antenna; and a multiplexer (213) having inputs coupled to the downconverters and having an output coupled to the blind narrow-band interference canceller(221) (Pg. 1, col. 2, lines 1-15, Pg. 1, col. 2, lines 21-30, Pg. 4, col. 1, lines 10-19, Pg. 6, col. 2, lines 13-22, Pg. 10, col. 2, lines 30-45).

Therefore it would have been obvious to one of ordinary skill in the art to modify Rakib et al. in view of Petrus et al. to incorporate a second receive antenna for receiving the communications signals of interest and the unknown narrow-band interfering signals; a second downconverter coupled to the second receive antenna; and a multiplexer having inputs coupled to the downconverters and having an output coupled to the blind narrow-band interference canceller in order to create antenna diversity (Petrus et al., Pg. 2, col. 1, lines 36-46).

(2) With regard to claim 5, claim 5 inherits all the limitations of claim 4. Petrus et al. further discloses in (Fig. 1) spatially oversampling the signals of interest and interfering signals (211, 213, 237) (Pg. 4, col. 1, lines 10-31, col. 2, lines 25-31, 41-43).

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rakib et al. (US Patent 6,426,983) as applied to claim 4, in view of Liu et al. (US Patent 5,905,721).

With regard to claim 6, claim 6 inherits all the limitations of claim 4. However Rakib et al. does not disclose temporally oversampling the signals of interest and interfering signals.

However Liu et al. discloses temporally oversampling the signals of interest and interfering signals (abstract, col. 8, lines 1-3, 13-18).

Therefore it would have been obvious to one of ordinary skill in the art to modify Rakib et al. in view of Liu et al. to incorporate temporally oversampling the signals of interest and interfering signals in order to determine the signature waveform with the number of data samples as small as the number of co-channel users (Liu et al., col. 2, lines 52-54).

Allowable Subject Matter

8. Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The instant application discloses a blind narrow-band interference cancellation apparatus. Prior art references show similar methods but fail to teach: **“a mixer having a first input coupled to an output of the prediction-**

error filter; a carrier tracking loop having an input coupled to an output of the mixer and having an output coupled to a second input of the mixer”, as in claim 2.

Conclusion

9. The prior art made record of and not relied upon is considered pertinent to applicant's disclosure:

a. Samuelli et al. US Patent 6,714,608 discloses a multi-mode variable rate digital satellite receiver.

b. Ojard et al. US Patent 6,826,242 discloses a method for whitening colored noise in a communication system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cicely Ware whose telephone number is 571-272-3047. The examiner can normally be reached on Monday – Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.


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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Cicely Ware

cqw
August 22, 2005



STEPHEN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600